Jan. 7, 1941. L. L. THOMPSON 2,228,185

SHALE SEPARATOR

Filed May 2, 1938 2 Sheets-Sheet 1

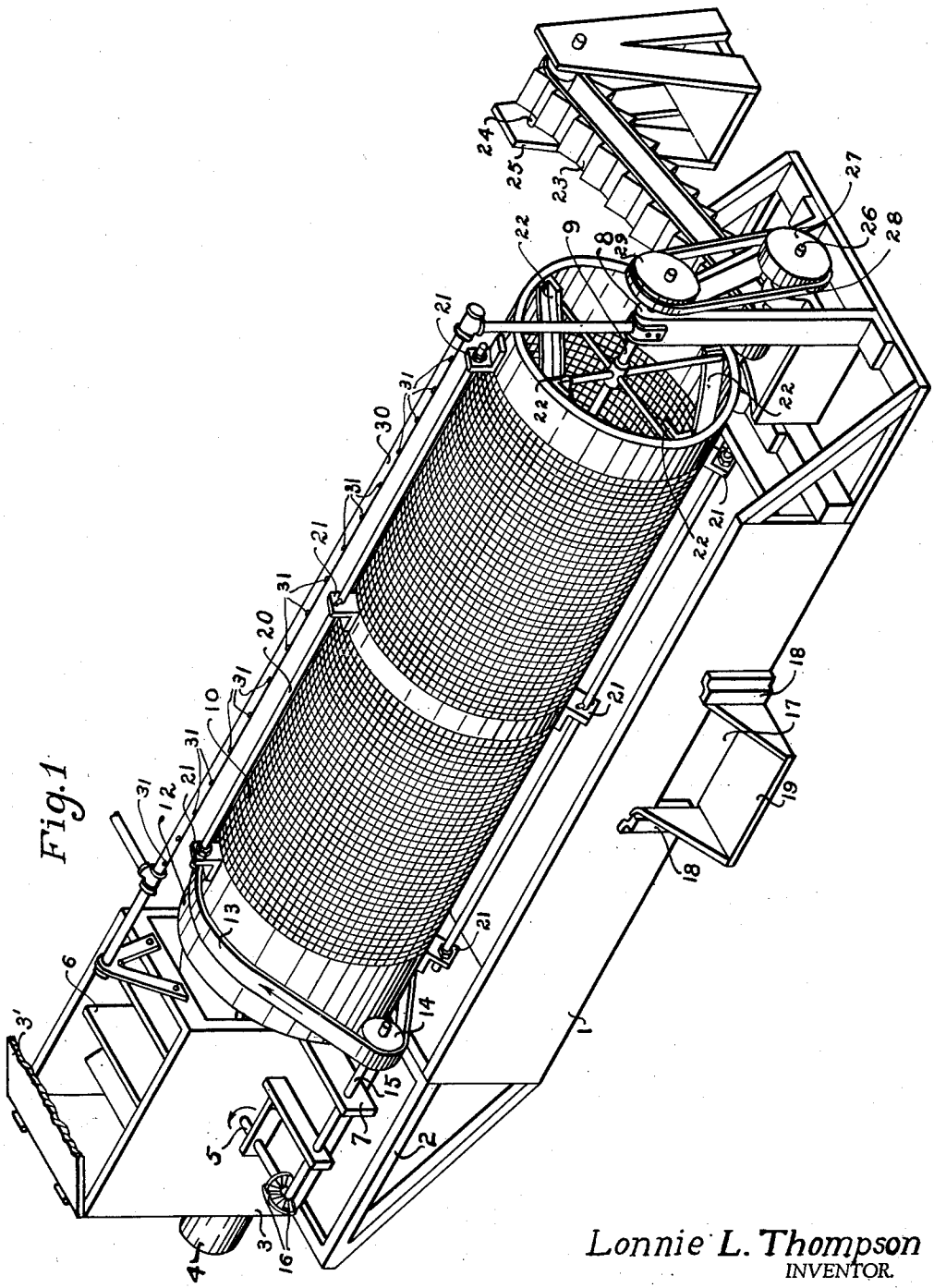


Fig. 1

Lonnie L. Thompson
INVENTOR.

BY J. Preston Sweeten
his ATTORNEY.

Jan. 7, 1941. L. L. THOMPSON 2,228,185

SHALE SEPARATOR

Filed May 2, 1938 2 Sheets-Sheet 2

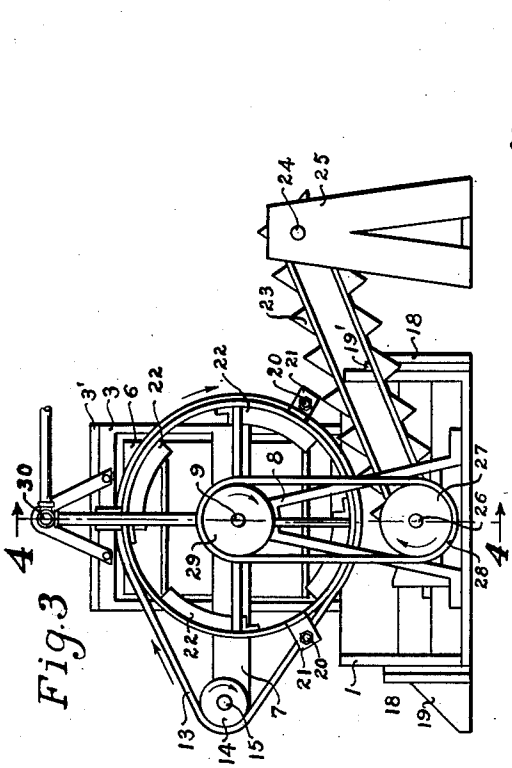


Fig. 3

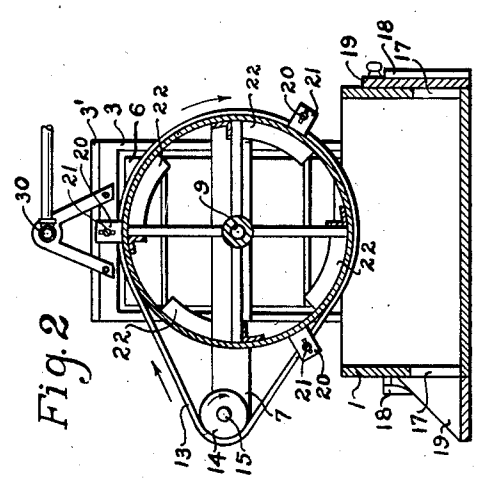


Fig. 2

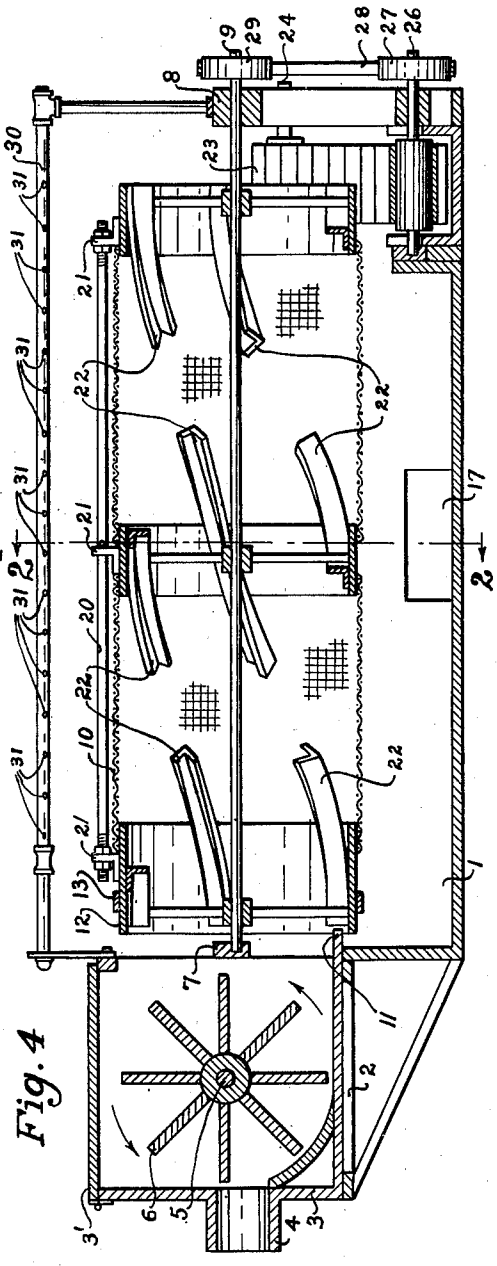


Fig. 4

Lonnie L. Thompson
INVENTOR.

BY J. Preston Sweeker
his ATTORNEY.

Patented Jan. 7, 1941 2,228,185

UNITED STATES PATENT OFFICE

2,228,185

SHALE SEPARATOR

Lonnie L. Thompson, Iowa Park, Tex., assignor to Thompson Tool Company, Inc., Iowa Park, Tex., a corporation of Texas

Application May 2, 1938, Serial No. 205,601

3 Claims. (Cl. 210—199)

This invention relates to an improvement in shale separators, and the like, as used for removing shale and rock cuttings from the circulating mud used in connection with rotary well drilling. If these particles of shale and rock cuttings are not removed from the circulating mud, difficulty is experienced often by the drill stem sticking because of the settling of the shale and cuttings around the drill stem if allowed to stand for an appreciable length of time.

Heretofore screens and separators used for this and other purposes having employed electric motors and gasoline engines for driving the separator mechanism, which requires a substantial amount of power due to the viscous condition of the mud.

The object of this invention is to utilize the force of the mud flowing from the drilling well into the slush pit for driving the shale separator without any additional power. The mud leaves the well under considerable force which can be utilized effectively for this purpose and which makes it unnecessary to employ additional power for driving the separator through which the mud passes. This is accomplished by coupling with the separator a paddle wheel arranged in the path of the flowing mud, so that the mud acts on the paddle wheel to rotate the separator.

Another object of the invention is to improve the construction of the shale separator by which it may be operated easily, is simple to install and is effective for its intended purpose.

Still another object of the invention is to improve the manner of discharging and removing the separated shale and cuttings, by directing them to an open end of the separator and into an elevator for lateral discharge therefrom at a distant point.

In carrying out these objects of the invention, a preferred embodiment of the invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a perspective view of the complete separator;

Fig. 2 is a transverse vertical section therethrough on the line 2—2 of Fig. 4;

Fig. 3 is an end elevation of the separator showing its discharge conveyor; and

Fig. 4 is a longitudinal sectional view through the separator, substantially on the line 4—4 of Fig. 3.

The separator is constructed with an open top box or enclosed frame designated generally by the numerals 1 which is adapted to receive the screened mud. At one end of the box 1 is an elevated frame 2 that supports a housing 3 adapted ot receive the incoming mud or water through a connection 4 at one side of the housing 3. Extending transversely through the housing 3 is a shaft 5 carrying a paddle wheel 6, fixed thereon with its paddles extending in front of the inlet 4 and in the lower portion of the housing 3 in position for engagement by the incoming mud and water for turning the paddle wheel and the shaft 5 in the direction indicated by the arrow in Fig. 4. A cover or door 3' may be provided, if desired, for closing the top of the housing 3 to prevent the mud from being ejected upwardly by the paddle wheel, and said cover is also important to confine in the housing 3 any gas liberated by the paddle wheel from the mud flowing through the housing, to allow detection of such gas by the operator merely upon the opening of the cover 3'.

Supports 7 and 8 are disposed at opposite ends of the box 1 in which is journaled a shaft 9 which carries a rotary screen 10 mounted thereon by means of the usual spiders. One end of the screen is in close proximity to the open side of the housing 3 and has a lip 11 formed on the bottom of the housing projecting into the open end of the screen 10 sufficiently to direct the mud and water flowing through the housing into the screen.

For the purpose of rotating the screen 10, a rim 12 thereof receives a belt 13 which extends around said rim and around a pulley 14 on a shaft 15, which shaft is journaled beside the housing 3, as shown in Fig. 1, and is connected through bevel gearing 16 or other means with the shaft 5 on which the paddle wheel 6 is mounted. Thus, rotation of the paddle wheel 6 by the incoming mud and water will drive the shaft 15 which in turn will operate the belt 13 to rotate the screen 10.

The incoming mud and water from the drilling well flows through the housing 3 and into the screen 10, the mud and water passing through the screen sides thereof and into the box 1. The latter is provided with outlet openings 17 at one or both opposite sides thereof. Each opening has guides 18 at opposite sides thereof adapted to receive a chute 19 which may be placed at either opening to direct the screened mud and water from the box 1 to the desired point. When the chute 19 is not used at either side, the opening 17 is preferably closed by means of a sliding door 19' which fits in the guides 18.

The rotary screen 10 has longitudinal tie rods 20 spaced at intervals about the circumference thereof and secured by brackets 21 for the purpose of bracing the screen and also to act as

agitators for the mud in the box 1 to prevent an accumulation therein which might interfere with the free flow of the mud and water through the screen.

Carried by the inner wall of the screen 10, or the rims thereof, and spaced at intervals about the inner circumference of the screen, are a plurality of helical fins or ribs 22. These ribs or fins 22 are curved in a direction such that flow of the mud and water in contact therewith increases the tendency of the screen to rotate. They also serve the additional purpose of tending to direct the shale and rock cuttings lengthwise through the screen to the open outer end thereof, while permitting the mud and water to pass through the walls of the screen into the box 1.

Mounted at the open end of the screen 10, and beneath the same, is the receiving end of an inclined and laterally directed bucket or other endless conveyor designated generally by the numeral 23 adapted to receive the separated shale and rock cuttings and to convey them to a point remote from the screen, discharging preferably in an elevated position. The outer end of the conveyor 23 has its pulley mounted on a shaft 24 journaled in an elevated support 25 to provide for this elevated point of discharge. This keeps the separated shale and rock cuttings away from the screen to a remote point, but any other suitable means may be provided as desired for the purpose. The lower end of the conveyor 23 has its pulley mounted on a shaft 26 which is preferably geared through belt or sprocket gearing with the shaft 9 for rotation thereby. A pulley 27 is shown as mounted on the shaft 26 and connected through a belt 28 with a pulley 29 fixed on the shaft 9.

A pipe 30 having perforations 31 therein, is supported directly above the rotary screen 10. Jets of water are directed from the perforations 31 downwardly onto the surface of the screen to assist in keeping the screen washed clean.

In operation, the force of the incoming mud and water as it comes from the drilling well will be sufficient to operate the paddle wheel 6, which in turn will rotate the screen 10 and the conveyor 23 for the discharge of the screened shale and rock cuttings. The force of the mud and water passing into the screen will act on the helical ribs or fins 22 to increase the rotation of the screen, but this will not become too rapid because the belt and gearing connection between the screen and paddle wheel 6 will utilize the paddle wheel operating usually in a heavy mud solution, to stabilize the speed of the screen and prevent the mud from passing therethrough too rapidly. Even the slightest flow of mud through the device will cause it to operate but it will not operate too rapidly even upon an excess flow.

I claim:

1. In a shale separator, an elongated receptacle, a rotary screen arranged over said receptacle and lengthwise thereof, means mounting said screen for rotary movement, means for rotating said screen, means for directing fluid into said screen for screening material therefrom and for passage of filtrate through the screen into the receptacle, said screen being so constructed and arranged as to direct screenings outside the receptacle, said receptacle having discharge openings at opposite sides thereof, each of said discharge openings having fastening devices for detachably securing a discharge spout thereto, a discharge spout detachably secured by said fastening devices to the receptacle at one of said openings, and a closure for the other opening detachably secured by the fastening devices thereof to the receptacle.

2. In a shale separator, a substantially cylindrical rotary screen adapted to receive material therein, said screen having end and intermediate rings with screen material therebetween, each of said rings having fins secured within the same, the fins secured to the end rings extending inwardly therefrom and the fins secured to the intermediate ring extending in opposite directions therefrom, the intermediate ring fins having the respective ends thereof spaced lengthwise of the screen from the adjacent ends of the end ring fins in nonoverlapping relation, said fins being arranged substantially in helical formation, and a receptacle arranged beneath the screen to receive filtrate therefrom.

3. In a shale separator, the combination of a receptacle, a hollow rotary screen mounted over said receptacle in position to receive fluid in one end thereof for the passage of filtrate through the screen into the receptacle and to direct screenings from the opposite end thereof outside the receptacle, said receptacle having discharge openings at opposite sides thereof, each of said discharge openings having a pair of upwardly extending guideways on opposite sides thereof, a chute having slides connected therewith detachably engaging the guideways of one opening for directing the screenings from the receptacle, and a door detachably engaging the guideways of the other opening for closing the same.

LONNIE L. THOMPSON.